

FEASIBILITY OF MARKETING
A DIGITAL CARTOGRAPHIC DATA BASE

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A DIGITAL CARTOGRAPHIC DATA BASE

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U.S. GEOLOGICAL SURVEY

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**FEASIBILITY OF MARKETING
A DIGITAL CARTOGRAPHIC DATA BASE**

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I INTRODUCTION

I INTRODUCTION

A. SCOPE

- This report was produced by INPUT for the United States Geological Survey (USGS) National Mapping Division.
- The primary objective of this study is to determine the feasibility of marketing digital cartographic data by USGS.
- Methods of selling and packaging digitized cartographic data are examined.
- Existing clients and potential clients are examined.
- The target data product is the digitized seven and one-half minute map.

B. METHODOLOGY

- Interviews, conducted in March 1981, consisted of:
 - Seven USGS personnel.
 - Thirty-five organizations.

- Research data included reference to:
 - Related INPUT reports.
 - USGS 1979 questionnaire data.
 - ITEK Optical System report of October 1980 and accompanying data.
- A sample copy of the questionnaire is included in Appendix B.

II EXECUTIVE SUMMARY

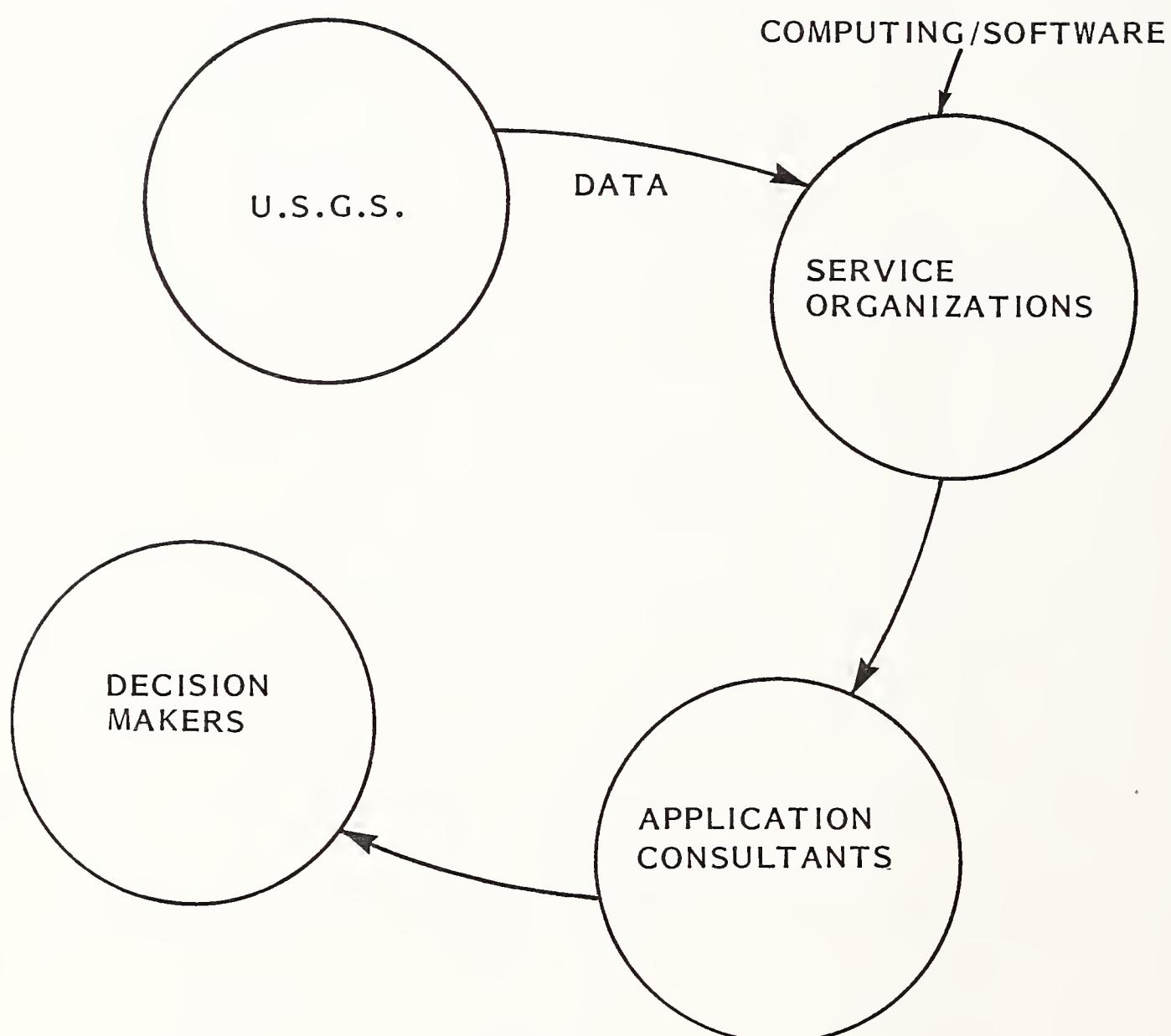
II EXECUTIVE SUMMARY

A. MARKET ANALYSIS

- The market structure contains four components:
 - USGS.
 - Data services organizations.
 - Application consultants.
 - End users.
- These market participants and their relationships are shown in Exhibit II-1.
- Respondents noted that the decision to buy digital data is a function of:
 - Accuracy.
 - Cost.
 - Timeliness.
 - Ease of use.

EXHIBIT II-1

COMMERCIAL MARKET STRUCTURE



- The expected method of delivery from USGS is by magnetic tape.

B. RESPONDENT ANALYSIS

- Accuracy was of high concern to respondents.
 - Past data distributed with errors has led to the belief on the part of some respondents that the quality of products from the USGS is a problem.
- The market for digital cartographic data for overall use is two tiered.
 - A microanalysis, operational market exists.
 - A macroanalysis, planning market exists.
- The leading edge users of digital cartographic data are:
 - Architectural/Engineering/Planning firms.
 - Services organizations.
 - Resources firms.
 - Government/Quasi-government organizations.

C. ANALYSIS OF RESPONSES

- Respondents preferences for the five major categories of data are shown in Exhibit II-2.

| EXHIBIT II-2

USER RANKINGS OF DATA COMPONENTS

COMPONENT	AVERAGE RANK*
ELEVATION	4.9
HYDROLOGY	2.8
LAND USE	2.9
BOUNDARY	3.0
TRANSPORTATION	2.6

* 1 = LOW VALUE, 5 = HIGH VALUE

- Budget data was generally not available or "buried" in with other costs.
- The most prevalent and equally ranked reference systems specified by respondents were:
 - State plane coordinate.
 - UTM grid.
 - Latitude/longitude.
- The prevalent software used was developed in-house. Of packaged software, SAS and ODESSEY were the most frequently mentioned.
- Scanners were used by six respondents.
- Areas of geographical interest were primarily:
 - USA.
 - States.
 - Regions.
- Focus of study was primarily rural, followed by urban and suburban.

D. IMPACT OF TECHNOLOGY

- Scanning technology will be the most prevalent change factor in improving data creation.

- Software for synthesis of networks and other characteristics is a major problem area.
- Proliferation of user site hardware will cause increased data demands.
 - Lack of standardization will discourage use of local data to build national data bases.
- On-line data storage costs will drop with the advent of optical storage products.
- Storage algorithms and techniques for efficient handling of cartographic data is still a fertile area.

E. RECOMMENDED STRATEGY FOR USGS

- Accuracy needs to be carefully controlled.
- The price should be averaged per quadrangle with \$2,000 as the acceptable cost for a single file of five features.
- Custom retrieval for requests and access software should be considered to meet various user needs.
- The USGS should not be a vendor of general cartographic software.
- USGS should develop a communication channel to and from users to disperse information and to assist in determining markets needs.
- The USGS definition of a customer for digital data needs to be clarified.

III MARKET ANALYSIS

III MARKET ANALYSIS

A. MARKET STRUCTURE

I. PARTICIPANTS

- The use of digital cartographic data is characterized by four participants. These are:
 - USGS.
 - Data services organizations.
 - Application consulting organizations.
 - End users.
- The market for digital cartographic data is two tiered. It is composed of a micro market and, a macro market. The characteristics of these two markets are shown in Exhibit III-I.
 - A typical macroanalysis would be site selection in a planning mode. A follow up would be a detailed microanalysis of specific areas of interest.

EXHIBIT III-1

MARKET SEGMENTS BY TYPE OF USE

FOCUS	SCALE	FREQUENCY OF USE	MODE OF USE
MACRO	1:24000 AND SMALLER	ONE STUDY	PLANNING
MICRO	1:400 TO 1:5000	REPEATED USE	OPERATIONAL

- These microanalyses are often of a more operational nature, with the resulting cartographic data becoming part of a system to be repeatedly used.

2. DECISION MAKING PROCESS

- The need for digital cartographic capability is established by two factors:
 - Product availability.
 - Increased user demand.
- The product availability factors include:
 - Software availability.
 - . There are currently over 40 different packages, services or series of programs being used for digital cartography.
 - Hardware availability.
 - . The growth of graphics capability and the lower cost of storage are making the delivery of cartographic data more feasible.
 - Other data availability.
 - . Digitized data from other sources act as a compliment to cartographic data.
- The user demand factors include:
 - Increasing requirements for management data.
 - Regulatory and legislative requirements.

- Time constraints in producing results.
- To fulfill this need for digital cartographic data users must perform a "make or buy" decision.
- This decision to buy an available product is a function of:
 - Accuracy.
 - Cost.
 - Timeliness.
 - Ease of use.
- The current sources of this data are:
 - USGS.
 - Computer services firms.
 - Applications firms.

B. METHODS OF DELIVERY

- Most digital cartographic data is now delivered to the buyer on reels of tape.
 - The expected delivery method from USGS is on magnetic tape, with a variety of density and encoding formats available.
- On-line data base purchases of digital cartographic data is currently small among the respondents.

C. ANALYSIS BY INDUSTRY SECTOR

- The following industry sectors were used for categorizing organizations.
 - Architecture, engineering, planning (AEP).
 - Government, quasi-government.
 - Resources.
 - Services (including computer).
 - Turnkey systems.
 - Universities.
 - Utilities.
- These groups may exist within a larger organization. For example, an AEP firm may also provide computer services and turnkey systems.
- The industry market participants may also be categorized by those organizations who are leading edge users. These users are shown in Exhibit III-2.
- Leading edge users are those that:
 - Understand the technology of digital cartography.
 - Have money to spend for data.
- Those that are not leading edge users are shown in Exhibit III-3.

EXHIBIT III-2

LEADING EDGE USERS

- ARCHITECTURAL, ENGINEERING,
PLANNING
- COMPUTER SERVICES ORGANIZATIONS
- RESOURCES
- GOVERNMENT, QUASI-GOVERNMENT

EXHIBIT III-3

NON-"LEADING-EDGE" USERS

USER	REASON FOR BEING IN THIS CATEGORY
TURNKEY SYSTEMS	DO NOT USE DATA DIRECTLY
UNIVERSITY	DO NOT HAVE MONEY
UTILITIES	UNSOPHISTICATED EXCEPT AS USER THROUGH SERVICE FIRMS. WANT MORE ACCURATE DATA

IV ANALYSIS OF RESPONSES

IV ANALYSIS OF RESPONSES

A. ANALYSIS OF FIVE MAJOR CATEGORIES

- Responses to the value of the five major categories are shown in Exhibit IV-I.
- For the transportation data most users had either no interest or very high interest.
- The elevation data was universally popular in demand.
- Hydrology and land use had an average appeal to a wide variety of respondents.
- Boundary data was of interest to only a limited section of the respondents.

B. BUDGETS

- Most users were unable to specify the dollar amount of their digital cartographic effort. Of those who responded, the typical amounts were \$100K to \$300K.
- One user had a budget of \$8 million per year for digital cartographic data.

EXHIBIT IV-1

USER RANKINGS OF DATA COMPONENTS

COMPONENT	AVERAGE RANK*
ELEVATION	4.9
HYDROLOGY	2.8
LAND USE	2.9
BOUNDARY	3.0
TRANSPORTATION	2.6

* 1 = LOW VALUE, 5 = HIGH VALUE

C. REFERENCE SYSTEMS

- The respondents were asked which of the following systems was their standard or preferred system.
 - State plane coordinate system.
 - UTM grid.
 - Latitude/longitude.
 - Zip codes.
 - Street address.
 - Area codes.
 - FIPS.
- The response tabulations are shown in Exhibit IV-2.
- Many service organizations used whatever systems were required by the customer.

D. SOFTWARE

- Most frequently software used was developed in-house.
- For software packages, SAS from SAS Institute and ODESSEY from Harvard Laboratory for Graphics (ISSCO) were the most prevalent.

EXHIBIT IV-2

REFERENCE SYSTEM STANDARD

SYSTEM	NUMBER OF MENTIONS
UTM GRID	12
STATE PLANE COORDINATE SYSTEM	9
LATITUDE/LONGITUDE	8
OTHER	2

- Results for the use of software are shown in Exhibit IV-3.

E. DATA ENTRY METHODS

- Six respondents had scanners. Most leading edge users felt this would be a large factor in future data development.
- Results about from the data entry methods are shown in Exhibit IV-4.

F. AREAS OF GEOGRAPHIC INTEREST AND FOCUS OF STUDY

- Most respondents were interested in rural areas as a focus of study.
- The areas of interest were approximately evenly distributed over the USA, states and regions.
- Geographical areas of interest and focus of study are presented in Exhibit IV-5.

EXHIBIT IV-3

SOFTWARE USED

PACKAGE	NUMBER OF MENTIONS
IN-HOUSE	16
SAS	4
HARVARD	3
INTERGRAPH	1
MOSS	1
GIRAS	1
SYNERCOM	1
STAMPEDE	1
USGS	1
MA	1
ESL	1
TOPO-IMAGE	1
SYSTEM-2000	1
VICAR	1
OTHER	1

EXHIBIT IV-4

DATA ENTRY METHODS

METHOD	NUMBER OF MENTIONS
MANUAL DIGITIZER	15
KEYING	9
AUTOMATIC DIGITIZER	8
SCANNER	6
OTHER	2

EXHIBIT IV-5

GEOGRAPHICAL AREAS OF INTEREST

AREA	NUMBER OF MENTIONS
REGIONAL	8
USA	7
STATE	6
COUNTY	2
METROPOLITAN	2
ALL	2

EXHIBIT IV-5 (Con't.)

FOCUS OF STUDY

FOCUS	NUMBER OF MENTIONS
RURAL	15
URBAN	5
ALL	3
SUBURBAN	4
NATIONAL	2
OTHER	2
COASTAL ZONE	1

V IMPACT OF TECHNOLOGY

V IMPACT OF TECHNOLOGY

A. DATA CREATION

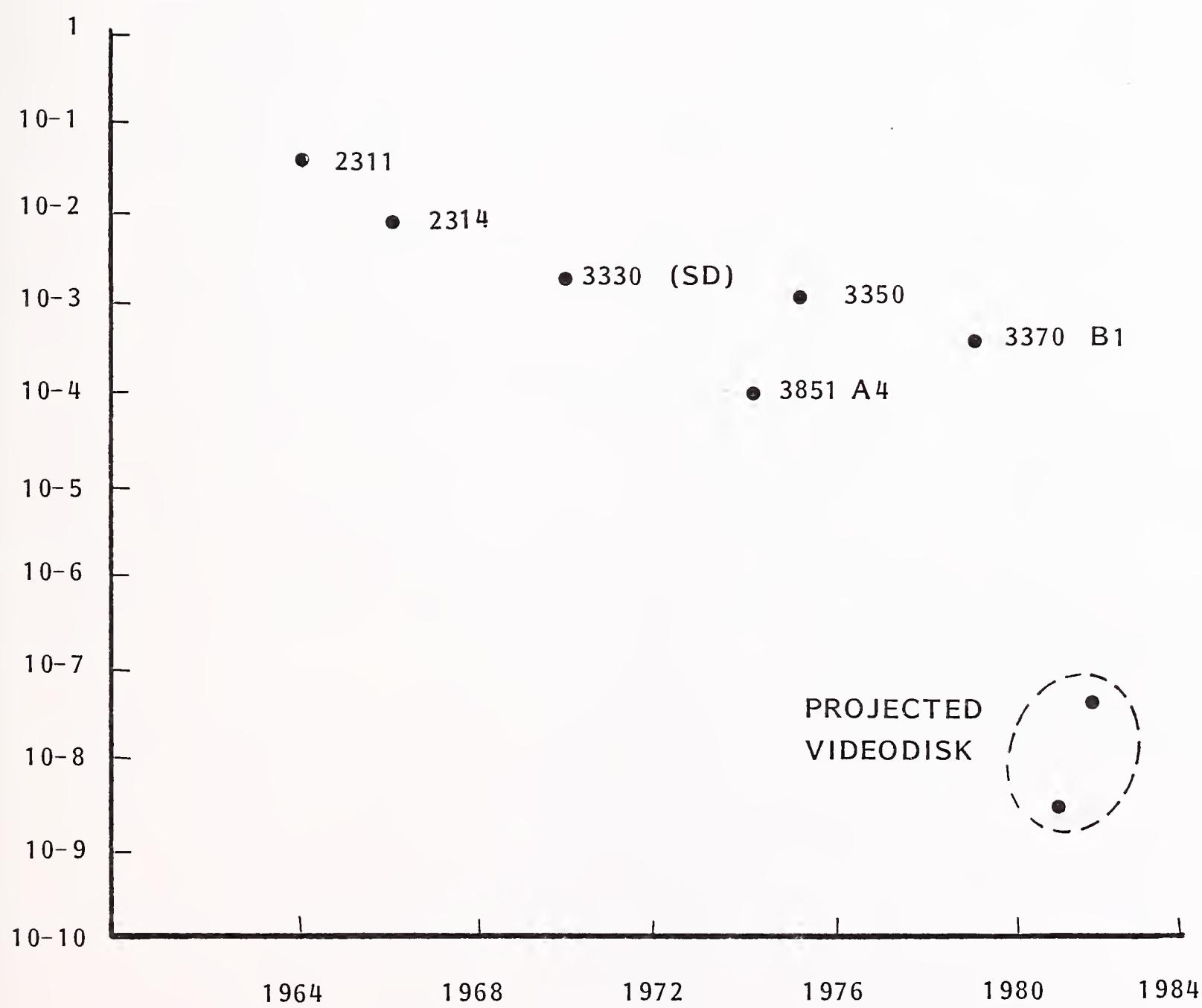
- Scanners will be the most prevalent change factor in improving data creation.
- Scanner technology will become increasingly less expensive.
- Software to synthesize networks and other characteristics is still a major problem area.
- Light pens with the ability to scan a path and develop line intelligence within that patch will improve the productivity of manual efforts.
- Several leading edge respondents believed that local data bases would be generated and would support federal efforts, not vice versa.
 - INPUT does not believe this phenomenon will hurt USGS efforts. The proliferation of capability would provide much more local data, but it would be incompatible and of varying accuracy.

B. DATA STORAGE AND DISPLAY

- Hardware to store data will drop in price by a factor of about two by 1985. The cost of disk storage is shown in Exhibit V-1.
 - Video storage of data will increase the use of digital cartographic data.
- Software.
 - Storage algorithms and techniques for efficient handling of cartographic data are still in a developmental mode. Significant gains in this area would improve the demand for data.
 - Both SAS from SAS Institute and ODESSEY from ISSCO plan expanded features and large growth in the user base for cartographic display.

EXHIBIT V-1

ON-LINE STORAGE COSTS



VI RECOMMENDED STRATEGY FOR THE USGS

VI RECOMMENDED STRATEGY FOR THE USGS

A. PRODUCT RECOMMENDATIONS

1. ACCURACY

- The USGS should be careful to distribute only data that has been quality controlled both in the creation and the distribution phases.
- Past distribution of DMA tapes with errors left some users questioning the quality of data. Though this was not the USGS' data, it was distributed by the USGS.
- If the USGS should become the distribution agent for other data, acceptance standards should apply.

2. PRICE

- The USGS should price quadrangles equally. Demand appears high for high density areas; low for low density areas.
- Current users state they are paying \$200 to \$300 for a quadrangle file.
- Most users did not know their true cost of creating data in-house.

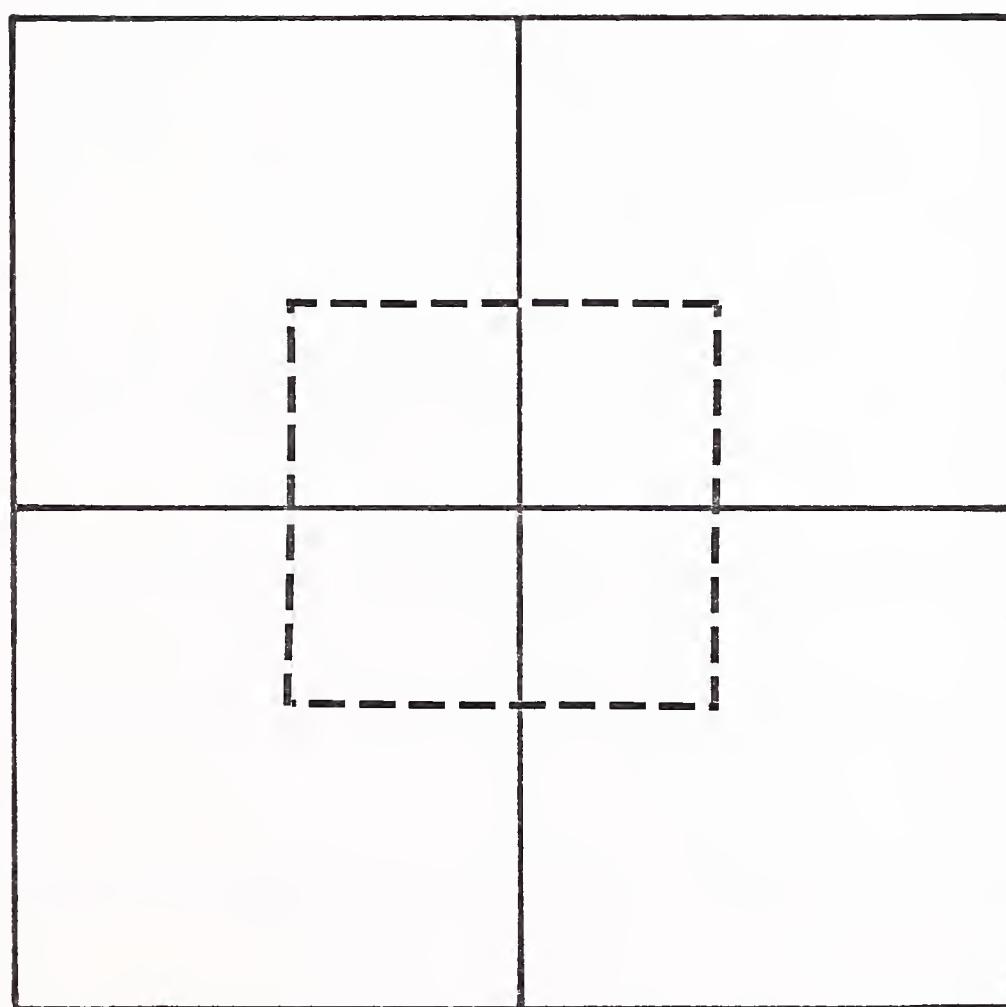
- Those that did not know the cost of creating data in-house felt that a quadrangle would have a value of about \$2,000 per quadrangle.
- Multiple quadrangle discounts are expected by large volume users.
- This price might also be broken down by feature categories, with price a function of cost.

3. SOFTWARE

- The USGS should offer one of the following approaches to users for data manipulation:
 - Access software.
 - Custom retrievals by the USGS.
- Access software would enable users to:
 - Retrieve the USGS data from tape and convert it from topologically ordered data to link or chain data.
 - Handle problem of data for adjacent areas of data is distributed in discrete pieces.
- The USGS should consider letting the size of the product be determined by user request. As shown in Exhibit VI-I, a user may only want a small portion of four quadrangles.
 - If this method were to be used, users could specify an "accuracy series" of data and a geographic area within that series.
- Users also mentioned the alignment problem of merging two adjacent areas of data. This approach, as well as a software approach, would meet that need.

EXHIBIT VI-1

QUADRANGLE DIVISIONS



- Custom retrieval by the USGS should handle the same problems as the access software.
 - A combination of these two approaches may be the most feasible method of meeting users needs.
 - The USGS should keep its software offering to a minimum.
- Software maintenance costs are often larger than data and software development costs.
- Sufficient software exists in the private sector for cartographic display. There are 30 to 40 packages available.
 - Several respondents were vehement regarding software. One respondent said: "The government has never come out with any software that was any good."
- The USGS should develop a communications channel to users of their data.
 - This would provide users with timely information on availability of data.
 - This would allow the USGS to prioritize its efforts based on market information.

B. CUSTOMER RECOMMENDATIONS

- To ensure price support and revenue, the USGS should adopt a definition patterned after the following:

- A customer may use the digital data provided by the USGS to produce results (non-digital) and sell those results.
 - A customer may not incorporate any digital USGS data in a distributed product.
- This would preclude a services firm from capturing multiple copy revenue and bypassing the USGS.
 - A potential disadvantage is that enforcement would be difficult. INPUT found that the "passing around" of data was not a problem in this context of this study.

APPENDIX A: PRESENTATION MATERIALS

SUMMARY

- TWO TIERED MARKET
 - MICRO ANALYSIS
 - 1:400 to 1:5000
 - DETAILED ANALYSIS
 - OPERATIONAL ASPECTS
 - MACRO ANALYSIS
 - 1:24,000 AND SMALLER
 - PLANNING ORIENTED
- THREE YEAR WINDOW ON AREAS OF INTEREST
- OFFER ONLY ACCESS SOFTWARE
- DO NOT OFFER SERVICES
- ONLY LEADING EDGE USERS AWARE OF COST/BENEFIT OF BUYING DATA

INPUT

I. SUMMARY

II. MARKET ANALYSIS

- FOCUS ON 1:24,000
- COMPONENTS IN MARKET
- RELATIONSHIPS

III. CONCLUSIONS AND RECOMMENDATIONS

- PRODUCT
- PRICE
- DELIVERY

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ORGANIZATIONS INTERVIEWED

AUI DATA GRAPHICS

HADRON

WMATA

WASHINGTON GAS LIGHT

GIBBS AND HILL

RAND McNALLY

TEXAS INSTRUMENTS

INTERGRAPH

SYNERCOM

DIGICON

HDR SCIENCES

BDM

GEOSPECTRA

APPLIED URBANETICS

HARVARD

TEXAS A & M

UNIVERSITY OF SOUTHERN CALIFORNIA

UNIVERSITY OF PENNSYLVANIA

UTAH INTERNATIONAL

CONSOLIDATED COAL

GULF RESEARCH

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ORGANIZATIONS INTERVIEWED

PACIFIC GAS AND ELECTRIC
JET PROPULSION LABORATORY
NATIONAL PARK SERVICE
TENNESSEE VALLEY AUTHORITY
USDA/FOREST SERVICE
COMPUTER GRAPHICS
APPLIED GRAPHICS
FEDERAL RAILROAD ADMINISTRATION
FEDERAL HIGHWAY ADMINISTRATION
TRANSPORTATION SYSTEM CENTER
AUTOMETRICS

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SOURCES

- USGS PERSONNEL
- PREVIOUS QUESTIONNAIRE DATA
- ITEK REPORT
- INTERVIEW 35 ORGANIZATIONS
- OTHER INPUT REPORTS

INPUT

ORGANIZATIONS	MARKET LEADING EDGE USERS CREATING \$ DEMAND
ARCH/ENG/PLANNING	X
TURNKEY SYSTEMS	
SERVICES	X
UNIVERSITIES	
RESOURCE	X
UTILITIES	
GOV'T/QUASI GOV'T	X

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ARCHITECTURAL, ENGINEERING, PLANNING

- GOOD DEMAND
- MAYBE BEST USGS MARKET
 1. THEY ARE INTERESTED ONLY IN FEW SITES AT A TIME
 2. MAY ACCUMULATE "CRITICAL MASS" ONLY IN LARGE FIRMS
 3. LESS CAPITAL THAN RESOURCES COMPANIES

"NEED DATA SOON"

"WHEN I NEED IT, I CAN'T WAIT"

"QUALITY OF DATA (ACCURACY) NEEDED"

- INTEREST IN ALL SCALES

INPUT

SERVICES

- GOOD DEMAND
- "LEARY" OF USGS
 - "POOR QUALITY IN PAST DATA"
- HIGH PERCENTAGE OF "LEADING EDGE" PEOPLE
- FEAR USGS AS COMPETITOR IF IT OFFERS SERVICES
- INTEREST IN ALL SCALES
- INTEREST IN VARIETY OF CATEGORIES

— INPUT —

RESOURCES

- LARGE AMOUNT DONE ALREADY
- PIC POTENTIAL COMPETITION
- LARGE DEMAND ON PROPRIETARY BASIS
- BOUNDARY AND LAND NET INTEREST

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UTILITIES

- POOR PROSPECT FOR 1:24,000
- NEED GREATER ACCURACY, LARGER SCALE

— INPUT —

DECISION MAKERS PROCESS

NEED FOR DIGITAL CARTOGRAPHIC CAPABILITY

- ESTABLISHMENT
 - SUPPLY
 - SOFTWARE AVAILABILITY
 - HARDWARE AVAILABILITY
 - OTHER DATA AVAILABILITY
 - DEMAND
 - IMPROVED DECISION MAKING
 - REGULATORY
 - TIME CONSTRAINTS
- FULFILLMENT
 - MAKE OR BUY IS FUNCTION OF:
 - COST
 - TIME
 - QUALITY/ACCURACY
 - EASE OF USE
 - SOURCES TO BUY

USGS

SERVICE FIRMS

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MARKET PARTICIPANTS

USGS

DATA

SERVICE ORGANIZATIONS

VALUE ADDED
SERVICE

APPLICATIONS CONSULTANTS

APPLICATION
EXPERTISE

DECISION MAKERS

END USER

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DEMAND

DEMAND FOR DATA IS IN 3 YEAR WINDOW.

BEYOND THIS, USERS WILL BEGIN CREATING DATA THEMSELVES OR CAUSING CREATION OR USE SERVICE FIRMS

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WITHIN BROAD LIMITS, WHAT ARE CURRENT USERS PAYING FOR DATA AND HOW MUCH WOULD POTENTIAL USERS BE WILLING TO PAY FOR DIGITAL DATA?

SOURCES

USGS

- \$200 - \$300 DOLLARS
- DEM/DMA TAPE

INHOUSE

- LABOR, EQUIPMENT COST WERE
LARGELY UNKNOWN, WITH EXCEPTION
OF LEADING EDGE USERS

LEADING EDGE USERS PEGGED VALUE AT "SEVERAL THOUSAND PER QUAD"

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PRICE

- AVERAGE PRICING IS RECOMMENDED
- SINGLE PRICE FOR ALL QUADS
 - SIMPLICITY
 - EQUITABLE
- SUBSTANTIAL QUANTITY DISCOUNTS
 - "WOULD WANT A DEAL IF BOUGHT 50 INSTEAD OF 2"
 - "COULD NOT AFFORD \$3K PER QUAD FOR 200 QUADS"
- VARIABLE PRICING BY THEME
 - FUNCTION OF COST TO CREATE

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COORDINATE SYSTEMS USED ARE:

- STATE PLANE COORDINATE SYSTEM
- UTM GRID
- LAT/LONG

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WHAT "COMPETITIVE" DATA BASES ARE THERE FROM WHICH POTENTIAL USERS COULD OBTAIN GENERALLY SIMILAR DATA? MIGHT THERE BE A COMPETITIVE BASE IN THE FUTURE?

CURRENTLY ONLY COMPETITION IS VERY LIMITED IN ITS DEPTH AND IS SCATTERED

IN 3 YEARS, SEVERE COMPETITION WILL DEVELOP IF NEEDS ARE NOT MET.

COMMENT:

IT ONLY TAKES ONE VENDOR WITH SUFFICIENT FUNDING TO LAUNCH EFFORT.

INPUT

HOW SHOULD THE USGS SELL DATA FROM THE DATA BASE?

HOW SHOULD DATA BE PACKAGED?

- TAPE IS ACCEPTED MEDIUM
 - OFFER VARIETY OF DENSITIES, ENCODING SCHEMES, ETC.:
 - 7 AND 9 TRACK
 - EBCDIC, ASCII
 - 800, 1600, 6250 BPI
- OFFER ACCESS SOFTWARE TO GET DATA OFF TAPE AND INTO USERS FORMAT.
- DO NOT GO INTO GENERAL CARTOGRAPHIC SOFTWARE DISTRIBUTION
- TOPOLOGICALLY ORDERED DATA IS DIFFICULT TO USE. CONSIDER OFFERING ALTERNATIVES

INPUT

SHOULD THE USGS RETAIL DATA OR ONLY WHOLESALE IT TO SEMI-GOVERNMENT OPERATOR OR TO A PRIVATE SECTOR OPERATOR WHO WOULD THEN RETAIL THE DATA, POSSIBLY COMBINING IT WITH OTHER INFORMATION OF A THEMATIC NATURE?

- MARKET IS MORE EFFECTIVE IN PLANNING USES IN THIS IMMATURE MARKET
- THEREFORE, USE FIRMS IN MARKET
- USGS SHOULD NOT ATTEMPT TO AUCTION RIGHTS
 - CONTRACTING MECHANISM TOO SLOW
 - QUICKLY MARKET CHANGING
 - OVERSIGHT PROBLEM DIFFICULT

INPUT

CUSTOMER DEFINITION/PRICE SUPPORT

- CUSTOMER MAY USE DATA TO PRODUCE RESULTS (NON-DIGITAL) AND SELL THEM.
- CUSTOMER MAY NOT INCORPORATE ANY DIGITAL USGS DATA IN DISTRIBUTED PRODUCT.

— INPUT —

ARE THE FIVE MAJOR CATEGORIES SUFFICIENT TO MEET DEMAND? SHOULD ADDITIONAL CATEGORIES BE PROVIDED FOR INITIALLY OR PHASED IN OVER A PERIOD OF TIME?

RANK OF DEMAND FOR THE FIVE CATEGORIES IS:

ELEVATION

HYDROLOGY

BOUNDARY

TRANSPORTATION

LAND NET

INPUT

SHOULD THE USGS CONSIDER OFFERING
SOFTWARE OF VARIOUS TYPES ALONG
WITH THE DIGITAL DATA PRODUCTS?

- OFFER ACCESS SOFTWARE ONLY
 - VENDORS AND USERS LEARY OF SOFTWARE FROM GOVERNMENT
 - POTENTIALLY MORE EXPENSIVE TO MAINTAIN THAN DATA
 - 30 TO 40 SOFTWARE PACKAGES/PIECES CURRENTLY AVAILABLE

INPUT

SHOULD THE USGS CONSIDER COMBINING DIGITAL DATA FROM ITS BASE WITH CUSTOMER-PROVIDED DATA? OR WOULD THE PROBLEMS OF COMPATIBILITY BETWEEN THE SETS OF DATA BE TOO UNPREDICTABLE FOR THIS TO BE A VIABLE ALTERNATIVE?

USGS SHOULD PURSUE JOINT DEVELOPMENT CONTRACTS.

USGS SHOULD NOT BE INVOLVED IN COMBINING IT'S DATA WITH USERS. IT IS IN STANDARDIZATION ROLE, NOT A SERVICE ROLE.

INPUT

TECHNOLOGICAL IMPACTS

- LOW COST OF STORAGE AND COMPUTING WILL ENHANCE MARKET
- STORAGE/RETRIEVAL/MERGING ALGORITHMS IS STILL FERTILE AREA
- BETTER SOFTWARE WILL SUPPORT GROWTH IN MAPPING
 - ADVANCES IN DATA STORAGE TECHNIQUES FOR VERY LARGE DATA BASES WILL BE AVAILABLE.
- SCANNING WILL LOWER COST OF USERS DEVELOPING DATA

INPUT

APPENDIX B: QUESTIONNAIRE

Y U S G

Cartographic Data Bases

1. a Do you currently use any digital cartographic data

YES (Go to 2.)

NO

b. If no, do you intend to use any over the next three years

YES

NO (Terminate interview).

2. What are the data items you use

Item	Quantity	Source	Cost	1984 volume
				Expected

3. What do you use this data for?

1. _____

7. _____

2. _____

8. _____

3. _____

9. _____

4 .

10. _____

11.

6 .

12.

4. What are your geographic areas of interest:

 USA Statewide: Name states _____. Regional: Name regions _____. County: Name counties _____. Metropolitan: Name cities _____. Other: _____.

5. Is your focus of study:

 Urban Suburban Rural Coastal Zone National Other _____.

6. Do you use any geographic software?

 None MOSS Harvard programs GIRAS SAS Other; specify: Name: _____.

Source: _____

7. What is type of data used and source:

1. topographic _____
2. geoscience _____
3. hydrological _____
4. oceanographic _____
5. meteorological _____
6. ecological _____
7. natural resource _____
8. economic _____
9. highway _____
10. rail _____
11. agricultural _____
12. land use _____
13. demographic _____
14. boundaries _____
15. safety related _____
16. utilities _____
17. parcels _____
18. other _____

8. What reference system is your standard:

State plane coordinate system

UTM grid

lat/long (geodetic position)

zip codes

street address

Area codes

FIPS

Other: _____

9. What format would you prefer to see the USGS data distributed in?

10. what data entry method do you use?

keying

manual digitizer

automatic digitizer

scanner

Other: _____

11. What is the dollar amount for your digital cartographic effort:

\$ _____ K.

Amt. service bureau _____

12. Can you break this down by:

- a. equipment \$ _____
- b. personnel \$ _____
- c. software \$ _____
- d. data \$ _____
- e. other \$ _____

13. What would be your estimate of the value in dollars to you of a digitized $7\frac{1}{2}$ minute map (1:24,000) including:

1. elevation (contours)
2. hydrology (drainage)
3. land use
4. boundary
5. transportation

14. How many would you buy: _____.

15. Please rank your value of these features:

<u>Features</u>	Rank (1-5)	1 = Low	5 = High
elevation (contours)			
hydrology (drainage)			
land use			
boundary			
transportation			

16. Would this data be useful to you in a service bureau approach where a firm provided software, hardware and consulting (as needed).

More useful

Less useful

Why?

17. What other types of digital cartographic data would be useful?

What trends do you see in this area for the next five years?

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For Vendors

18. Would this compliment or compete with any data you provide?

19. Do you feel the practice of "passing around" data would occur if the price of the data was \$3000 per quad.
(54,000 quads make up the continental U.S.)

20. Should the USGS provide software with the data?

YES NO

WHY?

Y	U	S	G				
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21. What are some service and software companies in the field?

<u>Org. Name</u>	<u>Services</u>	<u>Contact</u>	<u>Phone</u>
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